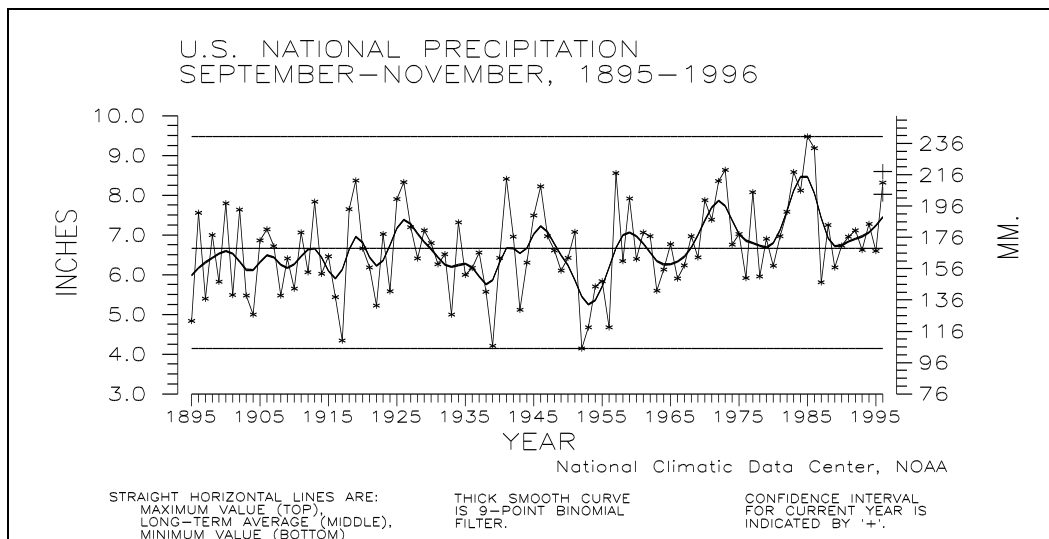
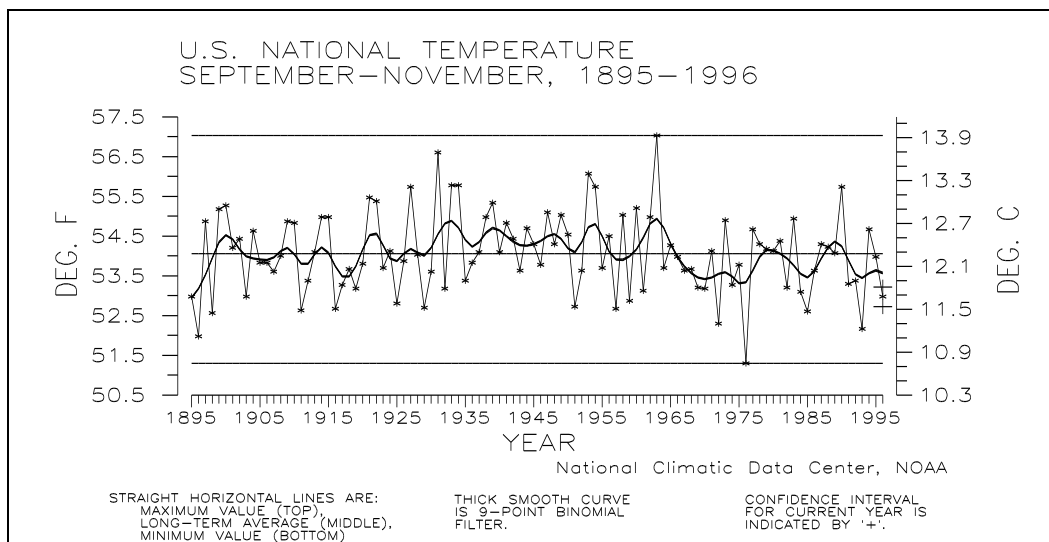


CLIMATE VARIATIONS BULLETIN



This CLIMATE VARIATIONS BULLETIN (CVB) is a preliminary report that puts current monthly climate anomalies into historical perspective using climate databases archived at the National Climatic Data Center (NCDC). It is issued on a monthly basis. Supplemental sections are included which address seasonal and annual perspectives, when appropriate.

Current data are based on preliminary reports from River Forecast Center stations and First and Second Order airport stations obtained from the National Weather Service (NWS) Climate Prediction Center (formerly, Climate Analysis Center), and preliminary tornado statistics obtained from the NWS National Severe Storms Forecast Center. **THE CURRENT DATA SHOULD BE USED WITH CAUTION.** These preliminary data are useful for estimating how current anomalies compare to the historical record, however the actual values and rankings for the current year will change as the final data arrive at NCDC and are processed.

The following NCDC datasets are used for the historical data: the climate division drought database (TD-9640), the hurricane datasets (TD-9636 and TD-9697), the tornado dataset (STORM DATA), and the monthly station dataset (LCD supplemental files). It should be noted that the climate division drought database consists of monthly data for 344 climate divisions in the contiguous United States. These divisional values are calculated from the 6000+ station Cooperative Observer network.

If you have access to the Internet, copies of the CVB are available via both the NCDC's World Wide Web (WWW) server and the NCDC's anonymous FTP server.

NCDC's WWW server

URL for the CVB: <http://www.ncdc.noaa.gov/publications/cvb/cvb.html>

NCDC's anonymous FTP server

Machine: <ftp.ncdc.noaa.gov>

Directory: [/pub/data/cvb](ftp://ftp.ncdc.noaa.gov/pub/data/cvb)

If you are a climate researcher and would like to order copies of the historical datasets used to make graphs of the type in this report, call 704-271-4994 or fax a letter to 704-271-4876 or mail a letter to the address given below, ATTN: Research User Services.

All other questions or requests for data should be made by calling 704-271-4800 or sending a fax to 704-271-4876 or by writing to:

National Climatic Data Center, NOAA
Federal Building
151 Patton Avenue, Room 120
Asheville, NC 28801-5001

If you use any of the information from this CVB, please identify "National Climatic Data Center, NOAA" as the source.

UNITED STATES NOVEMBER AND AUTUMN CLIMATE IN HISTORICAL PERSPECTIVE

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Asheville, NC 28801 USA

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Table 1. Precipitation and Temperature Ranks, Based
On the Period 1895-1996. 1 = Driest/coldest,
102 = Wettest/Warmest for Nov 1996,
102 = Wettest/Warmest for Oct-Nov 1996,
102 = Wettest/Warmest for Jun-Nov 1996,
101 = Wettest/Warmest for Dec 1995-Nov 1996.

Region	Nov 1996	Oct-Nov 1996	Jun-Nov 1996	Dec 1995- Nov 1996
-----	----	-----	-----	-----
Precipitation:				
Northeast	56	74	98	100
East North Central	76	88	58	54
Central	81	63	64	77
Southeast	71	73	70	61
West North Central	100	100	79	81
South	90	73	94	41
Southwest	74	63	78	41
Northwest	85	96	90	100
West	78	76	65	84
National	93	92	96	82
Temperature:				
Northeast	12	14	28	13
East North Central	10	22	23	8
Central	6	14	8	5
Southeast	26	21	10	9
West North Central	6	11	32	19
South	45	41	27	42
Southwest	68	60	86	99
Northwest	53	45	70	73
West	74	65	96	100
National	16	20	39	41

Table 2. Extremes, 1961-90 Normals, and 1996 Values For Nov. It Should Be Noted That the 1996 Values Will Change When the Final Data Are Processed.

Region	Precipitation (Inches)				1996
	Driest	Wettest	Normal		
-----	Value Year	Value Year	Pcpn		Pcpn
-----	-----	-----	-----		-----
Northeast	.88 1917	6.34 1983	3.84		3.44
East North Central	.20 1904	4.03 1931	1.89		2.21
Central	.71 1904	7.71 1985	3.53		4.17
Southeast	.83 1931	8.39 1948	3.30		3.44
West North Central	.06 1939	1.63 1896	.74		1.60
South	.20 1949	5.21 1940	2.63		3.73
Southwest	.06 1904	2.37 1905	.90		.98
Northwest	.30 1936	7.61 1909	3.78		5.07
West	.01 1929	5.56 1926	2.22		2.82
National	.88 1917	3.76 1983	2.32		2.91*

* Preliminary Value, Confidence Interval + or - .20 Inches

Region	Temperature (Degrees F)				1996
	Coldest	Warmest	Normal		
-----	Value Year	Value Year	Temp		Temp
-----	-----	-----	-----		-----
Northeast	32.3 1901	44.7 1931	38.7		34.8
East North Central	24.9 1959	39.8 1899	33.1		27.3
Central	35.9 1976	51.4 1931	44.2		38.8
Southeast	48.2 1976	62.4 1985	55.0		52.5
West North Central	17.3 1985	40.3 1949	30.9		25.2
South	45.5 1976	58.7 1909	52.5		51.6
Southwest	36.1 1972	46.9 1949	41.4		42.5
Northwest	27.2 1985	42.8 1899	37.0		37.4
West	40.0 1994	51.8 1949	46.0		47.8
National	38.2 1911	46.1 1909	42.7		40.4*

* Preliminary Value, Confidence Interval + or - .6 Deg. F.

Table 3. Temperature and Precipitation Rankings for
 Sep-Nov 1996, Based on the Period 1895-1996.
 1 = Driest/Coldest, 102 = Wettest/Hottest.

Region -----	Precipitation -----	Temperature -----
Northeast	90	21
East North Central	66	23
Central	69	6
Southeast	80	13
West North Central	101	16
South	83	26
Southwest	88	48
Northwest	99	46
West	72	67
National	93	14

Table 4. Extremes, 1961-90 Normals, and 1996 Values
For Sep-Nov

Region	Precipitation (Inches)				Normal Pcpn	1996 Pcpn
	Driest Value	Year	Wettest Value	Year		
-----	-----	-----	-----	-----	-----	-----
Northeast	5.01	1908	15.54	1977	10.82	12.71
East North Central	2.92	1976	11.82	1941	7.96	8.07
Central	3.99	1953	14.92	1926	10.20	10.55
Southeast	4.27	1931	17.71	1929	10.79	12.60
West North Central	1.21	1952	6.41	1946	3.44	5.72
South	3.79	1917	13.88	1986	9.19	9.92
Southwest	.95	1956	6.51	1972	3.48	4.16
Northwest	1.51	1936	11.35	1973	7.16	10.53
West	.38	1929	7.46	1982	3.85	3.96
National	4.14	1952	9.48	1985	7.11	8.31*

* Preliminary Value, Confidence
Interval + or - .29 Inches

Region	Temperature (Degrees F)				Normal Temp	1996 Temp
	Coldest Value	Year	Warmest Value	Year		
-----	-----	-----	-----	-----	-----	-----
Northeast	45.2	1917	53.8	1931	49.1	48.2
East North Central	41.6	1896	52.5	1931	46.6	45.2
Central	49.9	1976	61.2	1931	55.4	53.2
Southeast	59.5	1976	67.9	1919	63.9	62.9
West North Central	38.0	1985	50.3	1963	44.5	42.5
South	58.2	1976	68.2	1931	63.2	62.4
Southwest	49.9	1912	56.1	1963	52.9	52.7
Northwest	41.9	1985	50.3	1963	47.3	47.1
West	53.2	1916	59.2	1995	56.3	56.8
National	51.3	1976	57.0	1963	54.0	53.0*

* Preliminary Value, Confidence
Interval + or - .3 Deg. F.

Table 5.

Statistics for Selected River Basins: Precipitation Ranking for Oct-Nov 1996, Where Rank of 1 = Driest, 102 = Wettest, Based on the Period 1895 to 1996; Areal Percent of the Basin Experiencing Severe or Extreme Long-Term (Palmer) Drought, and Areal Percent Of the Basin Experiencing Severe or Extreme Long-Term (Palmer) Wet Conditions, as of Nov 1996. River Basin Regions as Defined by the U.S. Water Resources Council.

River Basin -----	Precipitation Rank -----	% Area Dry -----	% Area Wet -----
Missouri Basin	97	.0%	64.1%
Pacific Northwest Basin	95	.0%	58.6%
California River Basin	63	28.8%	10.9%
Great Basin	99	.0%	38.3%
Upper Colorado Basin	88	.0%	.0%
Lower Colorado Basin	49	28.4%	.0%
Rio Grande Basin	54	.0%	.0%
Arkansas-White-Red Basin	76	.0%	12.7%
Texas Gulf Coast Basin	56	.0%	.0%
Souris-Red-Rainy Basin	94	.0%	32.9%
Upper Mississippi Basin	86	.0%	7.4%
Lower Mississippi Basin	82	.0%	.0%
Great Lakes Basin	66	.0%	36.2%
Ohio River Basin	48	.0%	30.3%
Tennessee River Basin	79	.0%	39.6%
New England Basin	70	.0%	18.3%
Mid-Atlantic Basin	77	.0%	68.5%
South Atlantic-Gulf Basin	72	.0%	2.6%

U.S. NATIONAL TEMPERATURE NOVEMBER, 1895-1996

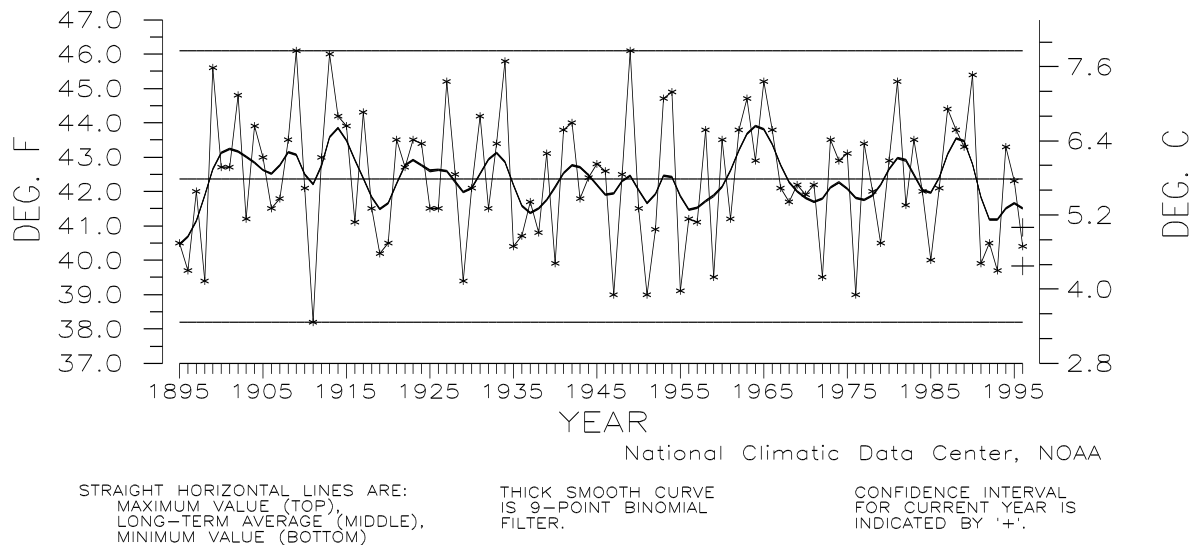


Figure 1: Preliminary data for November 1996 indicate that temperature averaged across the contiguous United States was much below the long-term mean, ranking as the 16th coolest November since 1895. About one third (34.3%) of the country averaged much colder than normal, while approximately 0% averaged much warmer than normal for the month.

U.S. NATIONAL PRECIPITATION NOVEMBER, 1895-1996

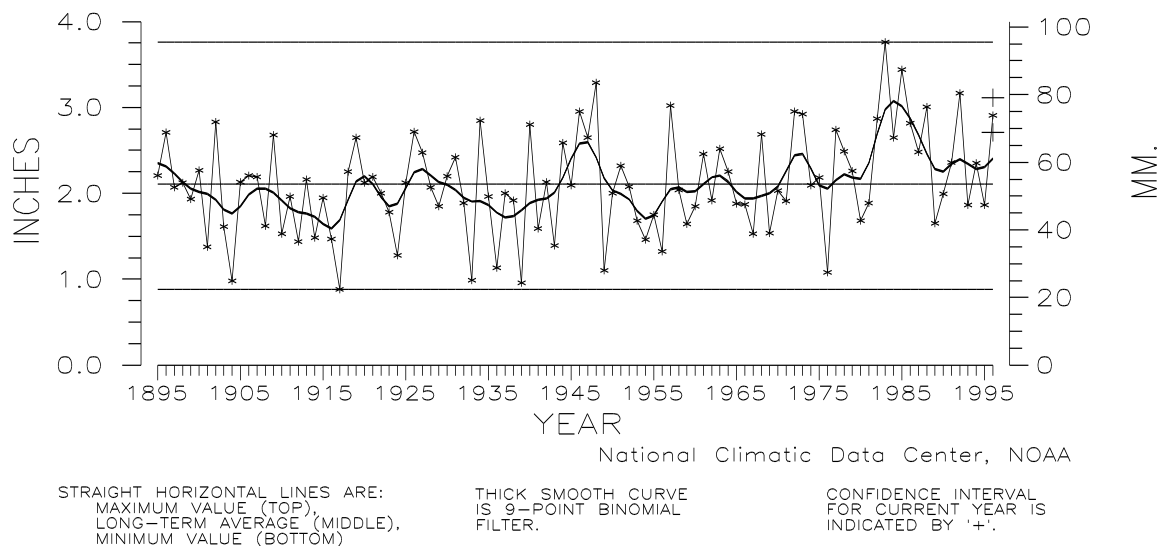


Figure 2: Preliminary data for November 1996 indicate that precipitation averaged across the contiguous United States was much above the long-term mean, ranking as the tenth wettest November since 1895. About a fourth (23.1%) of the country averaged much wetter than normal, while roughly two percent was much drier than normal. This year continued a pattern of near to much above normal precipitation characteristic of much of the last 15 years.

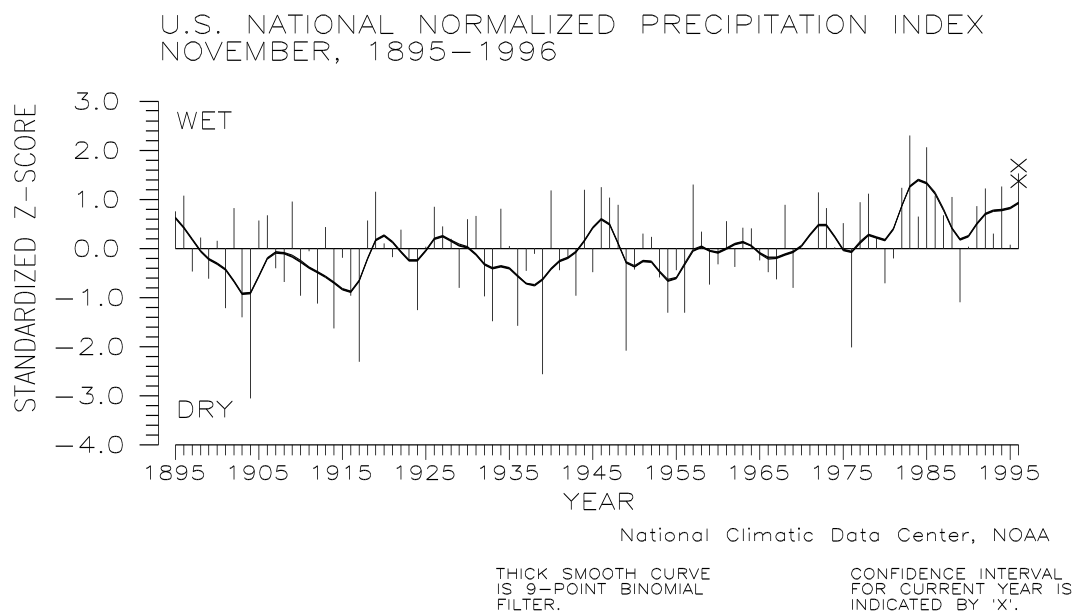


Figure 3: The preliminary national standardized precipitation index ranked November 1996 as the third wettest November on record. This standardized z-score is estimated to be accurate to within 0.16 index units and its confidence interval is shown as an 'X'.

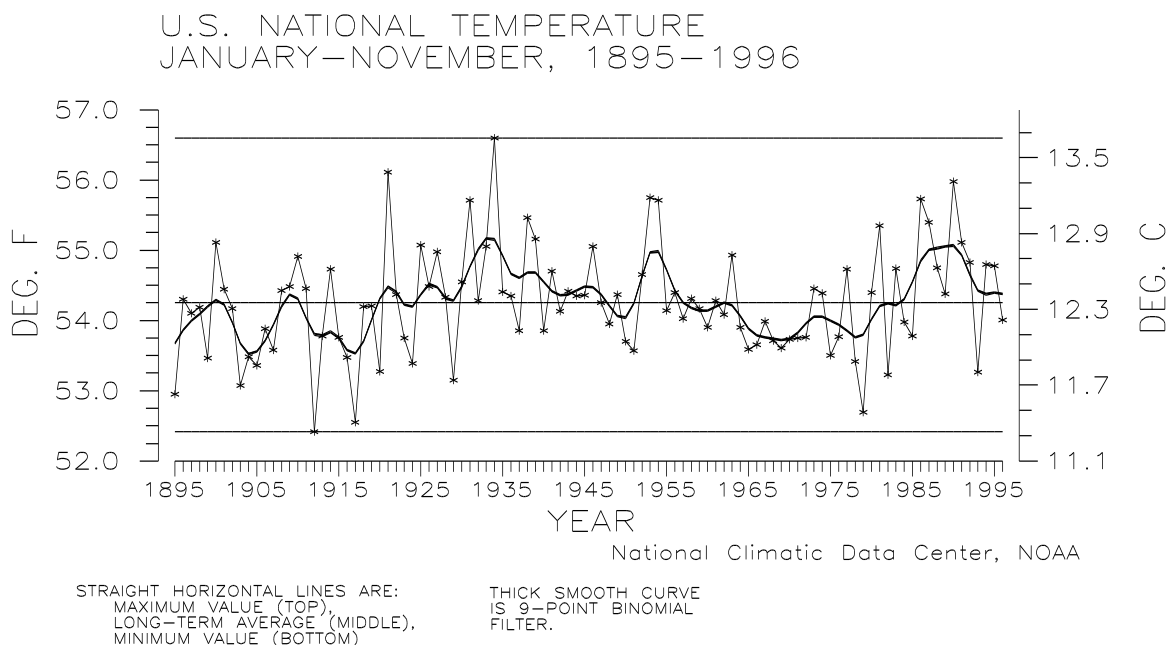
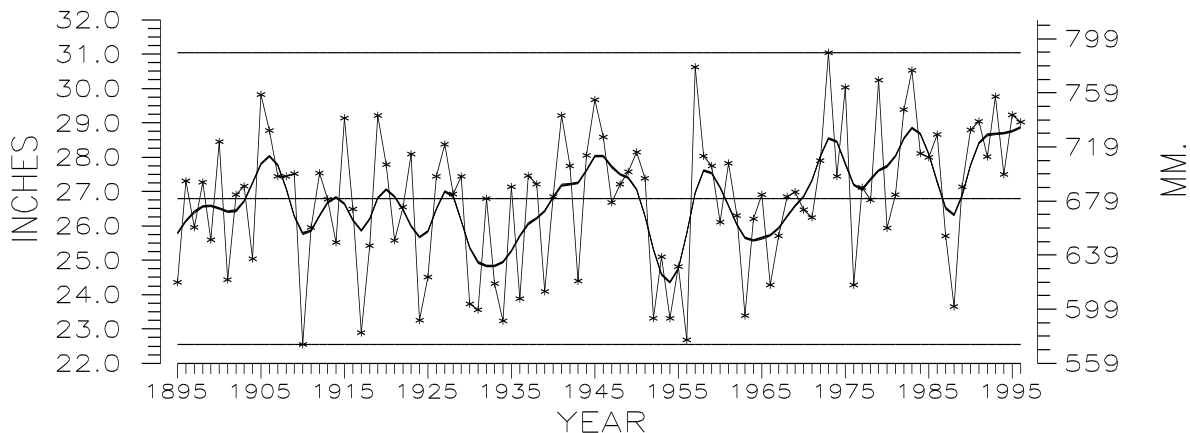


Figure 4: National averaged temperature for the year-to-date in 1996 was slightly below the long-term mean, ranking as the 40th coolest January–November since 1895. About one-sixth (17.8%) of the country averaged much warmer than normal while the same amount (18.1%) averaged much cooler than normal.

U.S. NATIONAL PRECIPITATION JANUARY–NOVEMBER, 1895–1996



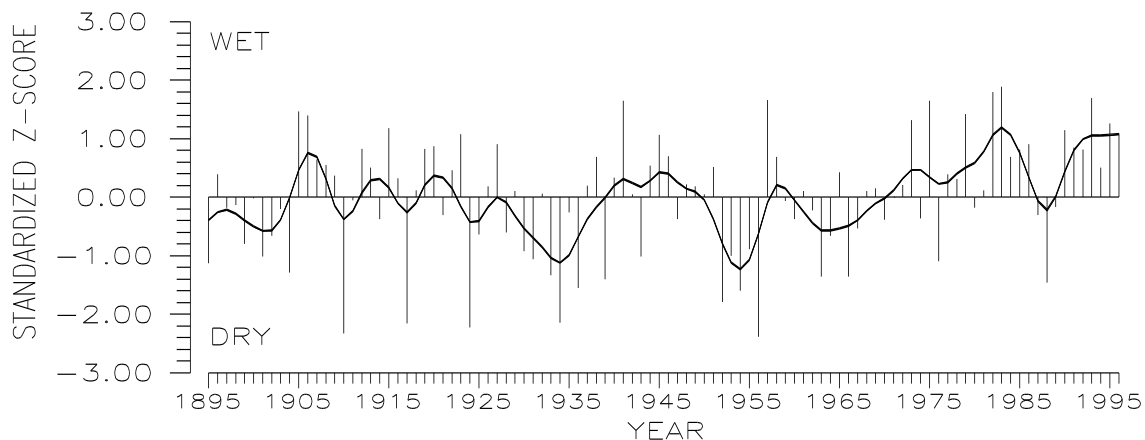
National Climatic Data Center, NOAA

STRAIGHT HORIZONTAL LINES ARE:
MAXIMUM VALUE (TOP),
LONG-TERM AVERAGE (MIDDLE),
MINIMUM VALUE (BOTTOM)

THICK SMOOTH CURVE
IS 9-POINT BINOMIAL
FILTER.

Figure 5: National averaged precipitation for the year-to-date in 1996 was well above the long-term mean, ranking January–November 1996 as the 15th wettest such period since 1895. A fifth (22.3%) of the country averaged much wetter than normal while about three percent was much drier than normal for this period. Thirteen of the last 15 years had wet January–November periods, with 1996 marking the eighth consecutive such wet period.

U.S. NATIONAL NORMALIZED PRECIPITATION INDEX JANUARY–NOVEMBER, 1895–1996



National Climatic Data Center, NOAA

THICK SMOOTH CURVE
IS 9-POINT BINOMIAL
FILTER.

Figure 6: The preliminary national standardized precipitation index ranked the January–November 1996 as the 14th wettest such period on record since 1895.

WEST NORTH CENTRAL REGION TEMPERATURE NOVEMBER, 1895-1996

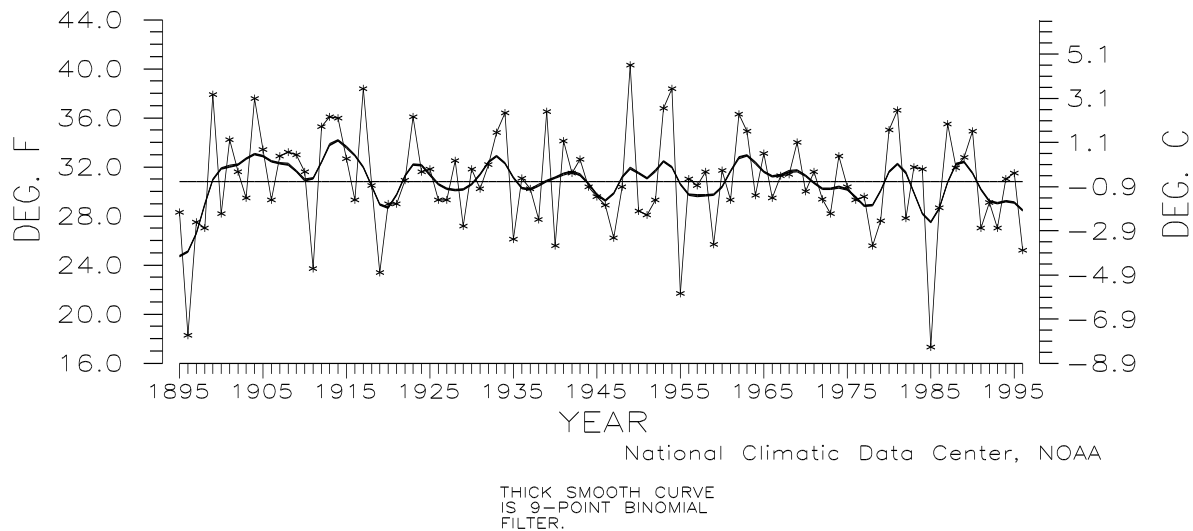


Figure 7: November 1996 was the sixth coldest November on record for the West North Central region, according to preliminary data. The last six Novembers have averaged near to well below the long-term mean.

WEST REGION TEMPERATURE NOVEMBER, 1895-1996

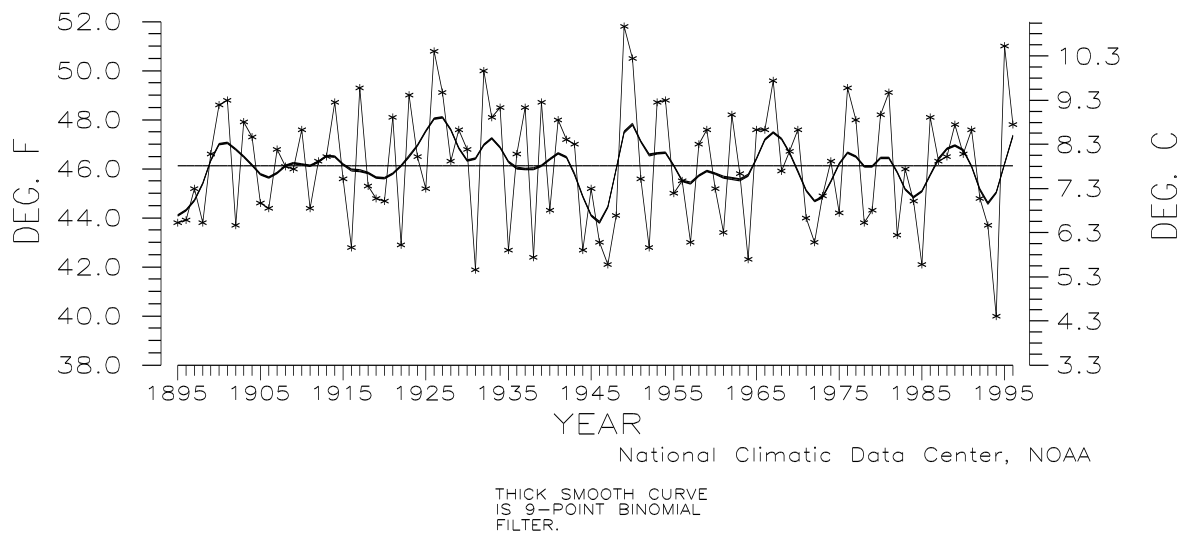


Figure 8: Of the nine regions in the contiguous U.S., the West region had the warmest temperature rank for November 1996, at 29th warmest. November 1996 and 1995 stand in sharp contrast to the Novembers of the three previous years.

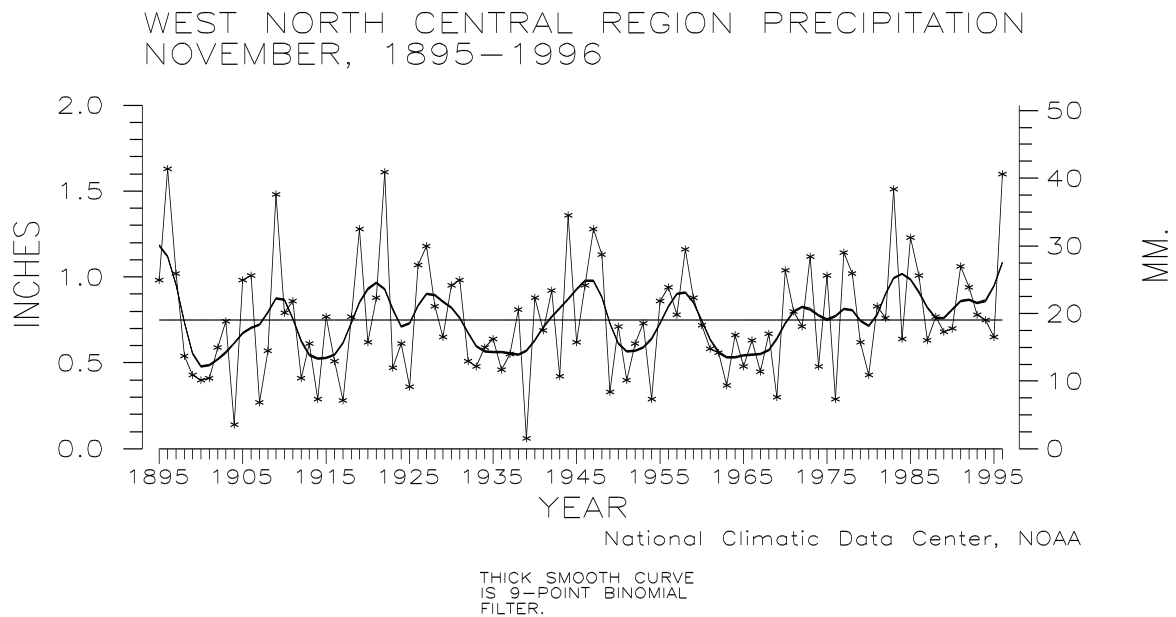


Figure 9: Preliminary data indicate the West North Central region was unusually wet, with 1996 having the third wettest November on record.

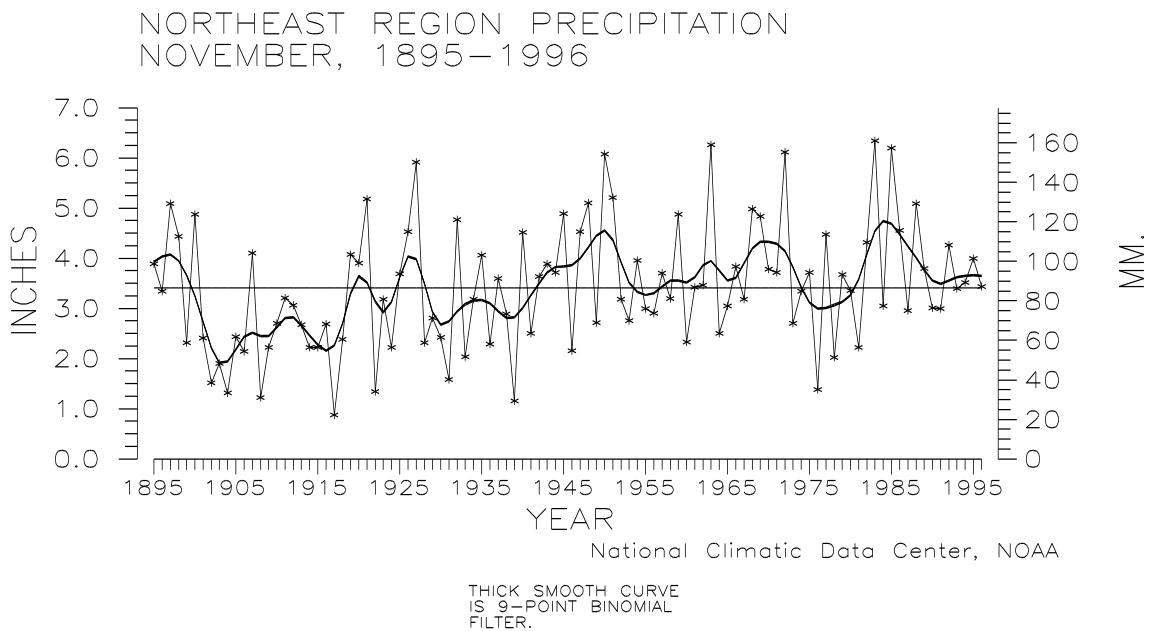


Figure 10: Of the nine regions in the contiguous U.S., the Northeast region had the driest rank for November 1996, at 56th driest (47th wettest). November precipitation variability from year to year for this region has been low during the last eight years compared to the previous eight years.

U.S. PERCENT AREA DRY AND WET JANUARY 1991 THROUGH NOVEMBER 1996

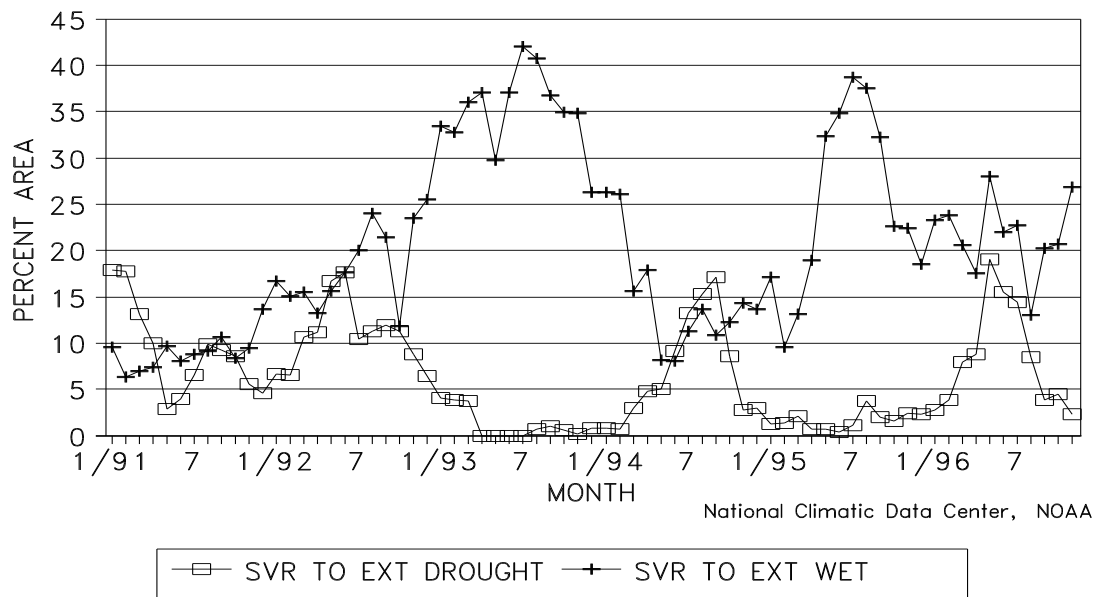


Figure 11: Long-term drought coverage (as measured by the Palmer Drought Index) continued its overall decreasing trend during November 1996. The percent area of the country experiencing severe to extreme wetness continued its recent rising trend, reaching just over 25% by the end of November. Core wet areas stretched from the Northeast to the Mid-Atlantic states, and from the central and northern Plains to the Northwest coast. Core dry areas were confined mainly to portions of the desert Southwest and southern Texas.

PRIMARY HARD RED WINTER WHEAT BELT PRECIPITATION OCTOBER–NOVEMBER, 1895–1996

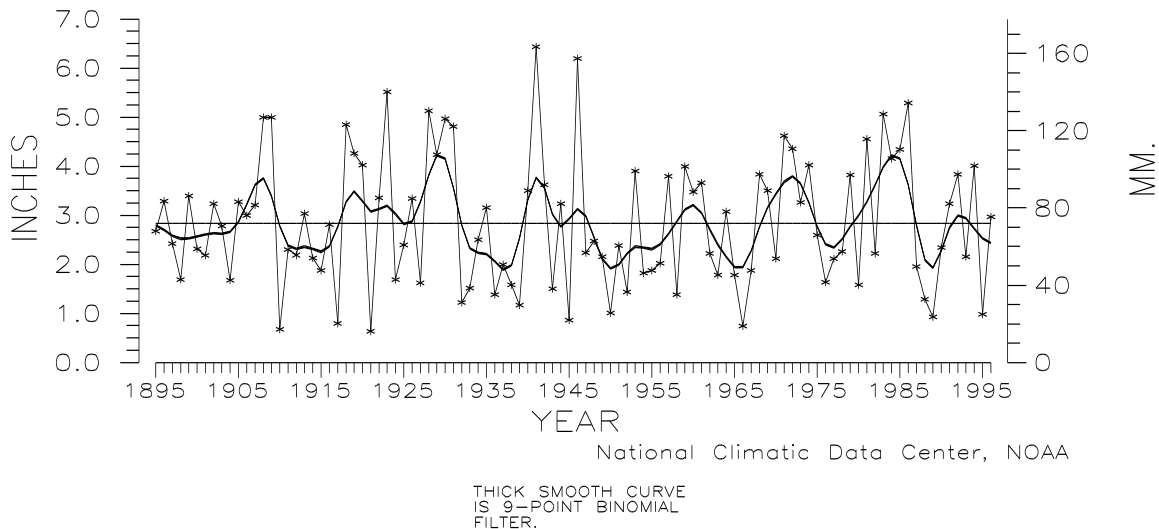


Figure 12: Total precipitation during the first two months of the growing season for the Primary Hard Red Winter Wheat Belt averaged about normal.

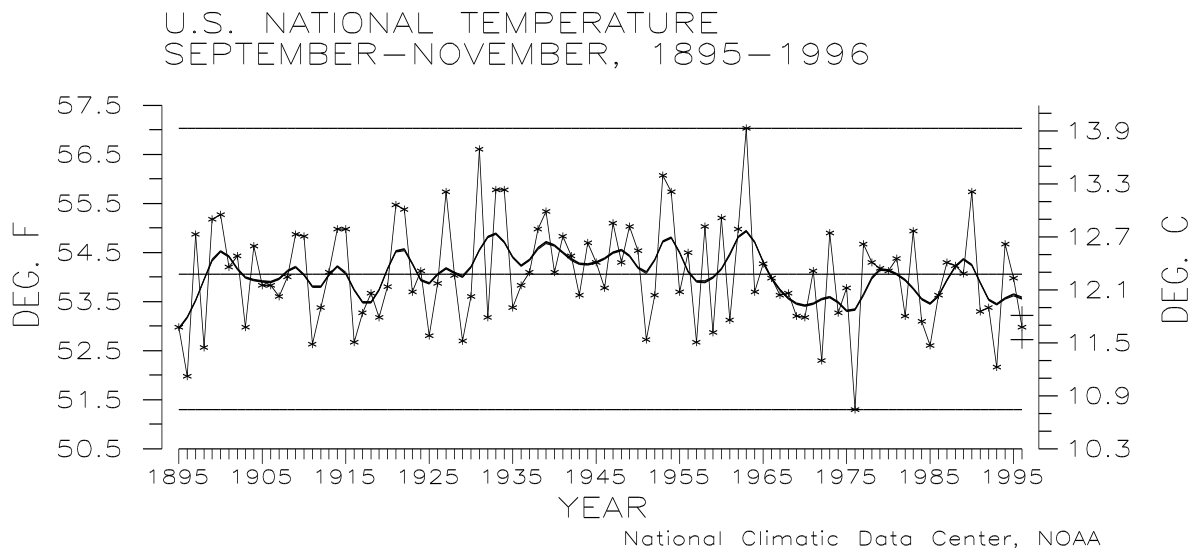


Figure 13: Preliminary data indicate that Autumn 1996 temperature averaged across the contiguous United States was well below the long-term mean, ranking as the 14th coldest Autumn on record. As indicated by the smooth curve, Autumn 1996 continues the below-normal pattern that has dominated this season since the mid-1960's. Just under a tenth (8.1%) of the country averaged much colder than normal for the season, with 0% much warmer than normal.

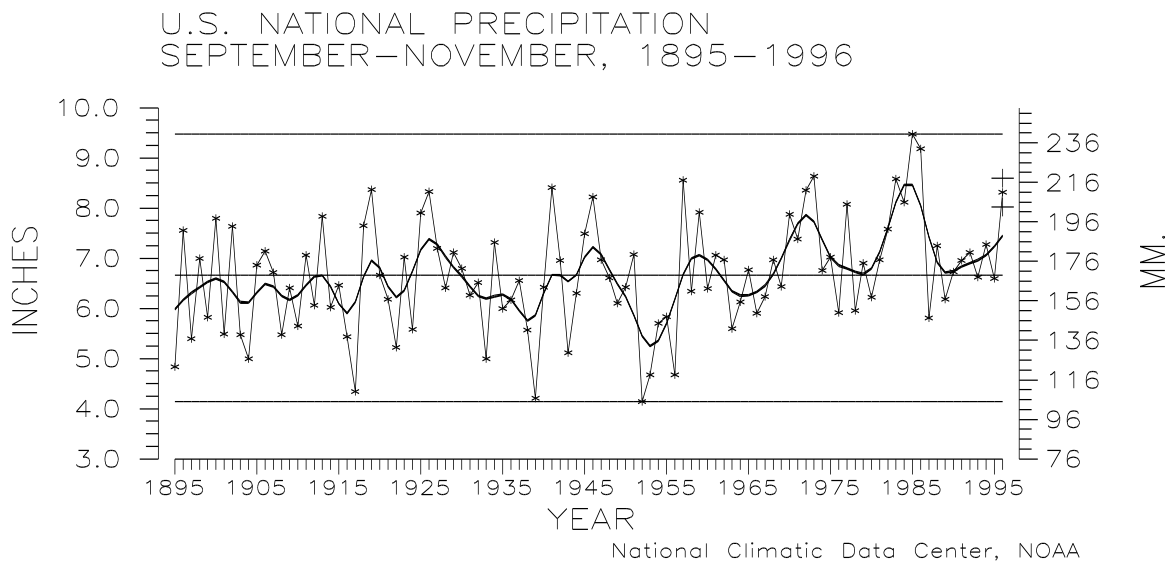


Figure 14: Preliminary data indicate that Autumn 1996 precipitation averaged across the contiguous United States was well above the long-term mean, ranking as the tenth wettest Autumn on record. Autumn 1996 national precipitation fit the pattern that has dominated since the late 1960's, that is, near to much wetter than normal.

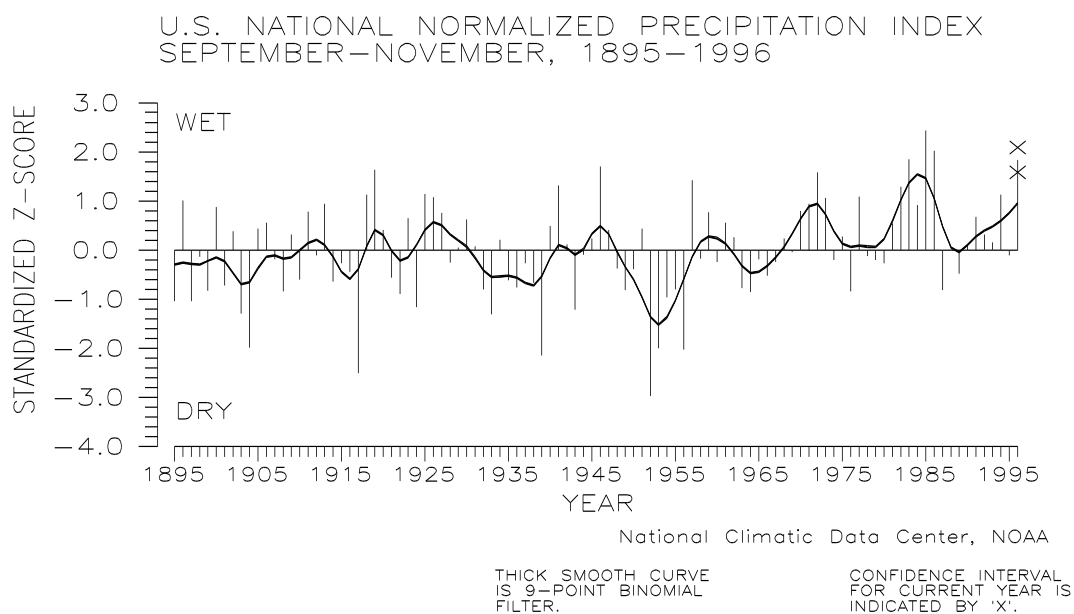


Figure 15: The preliminary national standardized precipitation index ranked Autumn 1996 as the fourth wettest Autumn on record. This standardized z-score is estimated to be accurate to within 0.25 index units. About a fourth (28.3%) of the country averaged much wetter than normal for the season, with 0% averaging much drier than normal.

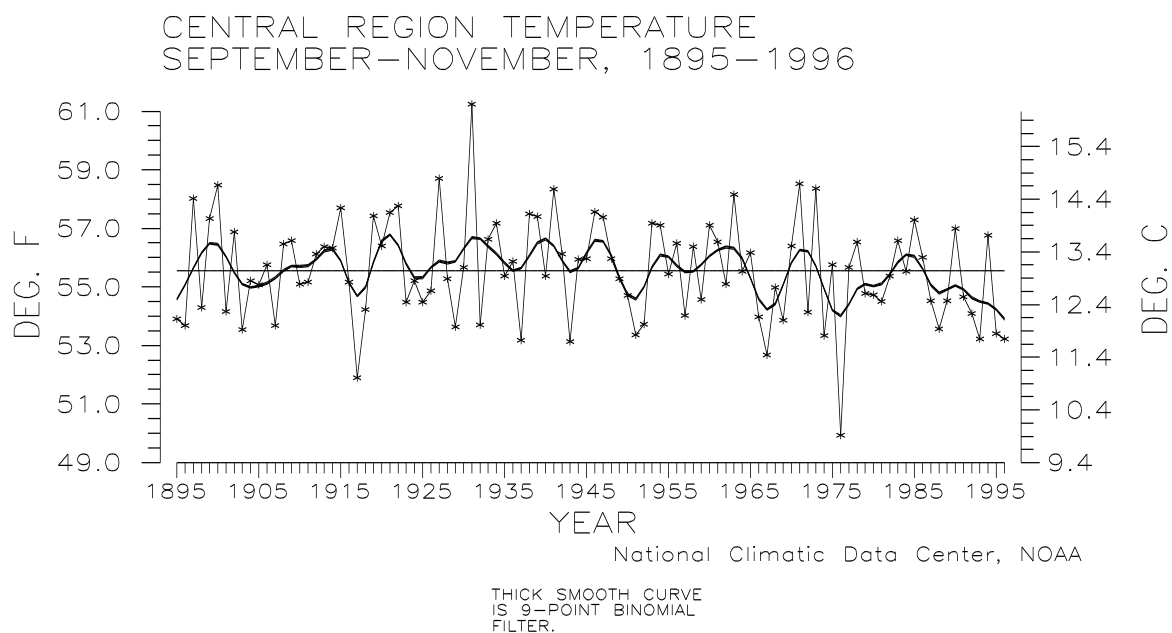


Figure 16: Autumn 1996 was unusually cold for the Central region, ranking sixth coldest since 1895 and continuing a pattern of cold Autumns. Eight of the last ten Autumns averaged well-below normal.

WEST REGION TEMPERATURE SEPTEMBER–NOVEMBER, 1895–1996

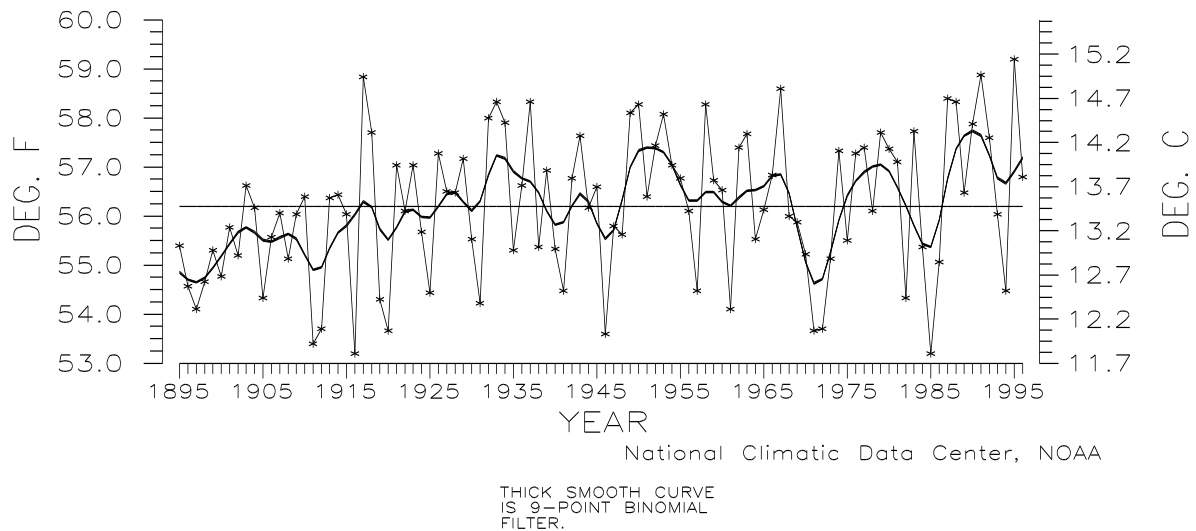


Figure 17: Of the nine regions in the contiguous United States, only the West region had an average Autumn 1996 temperature in the warm half of the historical distribution. Autumn 1996 ranked as the 36th warmest Autumn for this region and continued a pattern of warmth that has dominated the last ten years.

NORTHWEST REGION PRECIPITATION SEPTEMBER–NOVEMBER, 1895–1996

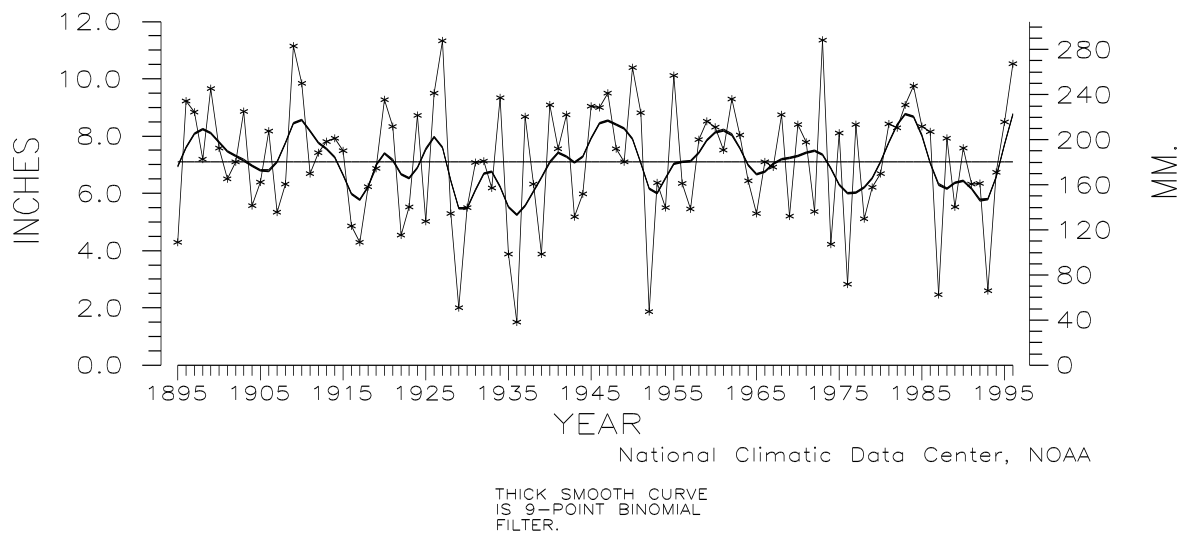


Figure 18: Autumn 1996 was unusually wet in the Northwest region, ranking as the fourth wettest Autumn on record and departing from the dry pattern that has dominated much of the last ten years.

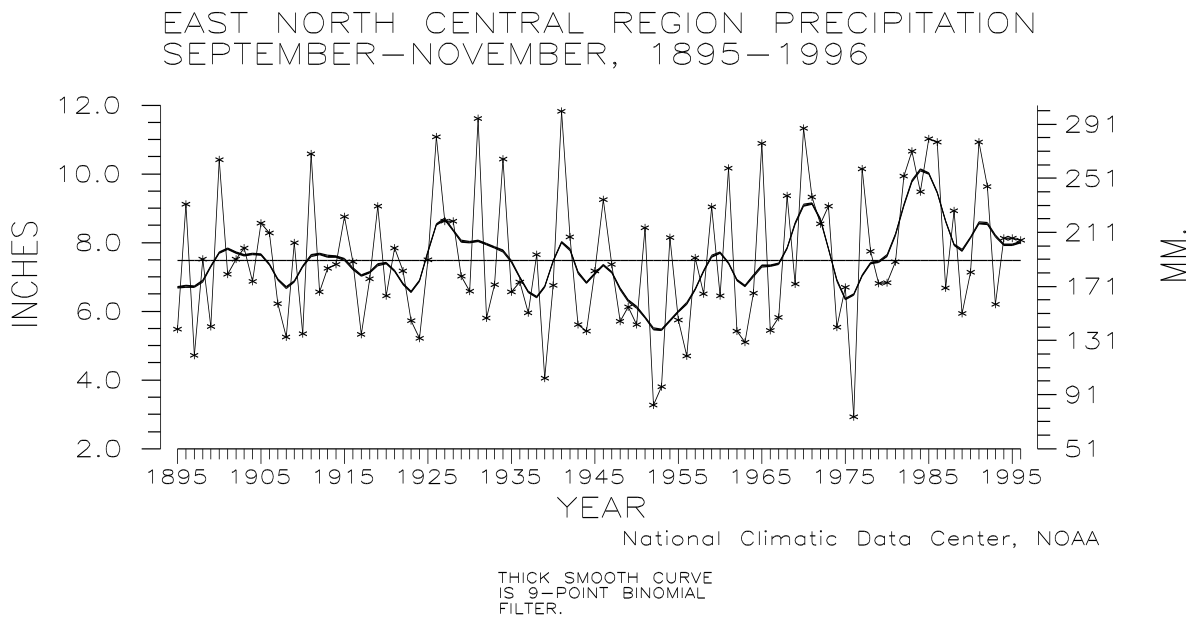


Figure 19: Of the nine regions in the contiguous United States, the East North Central region had the driest rank for Autumn 1996, at 66th driest (37th wettest). 1996 continues a pattern of slightly to much wetter than normal autumns which has dominated this region for the last 15 years.

NUMBER OF OBSERVED TORNADOES, U.S.A. AUTUMN (SEP–NOV), 1953–96

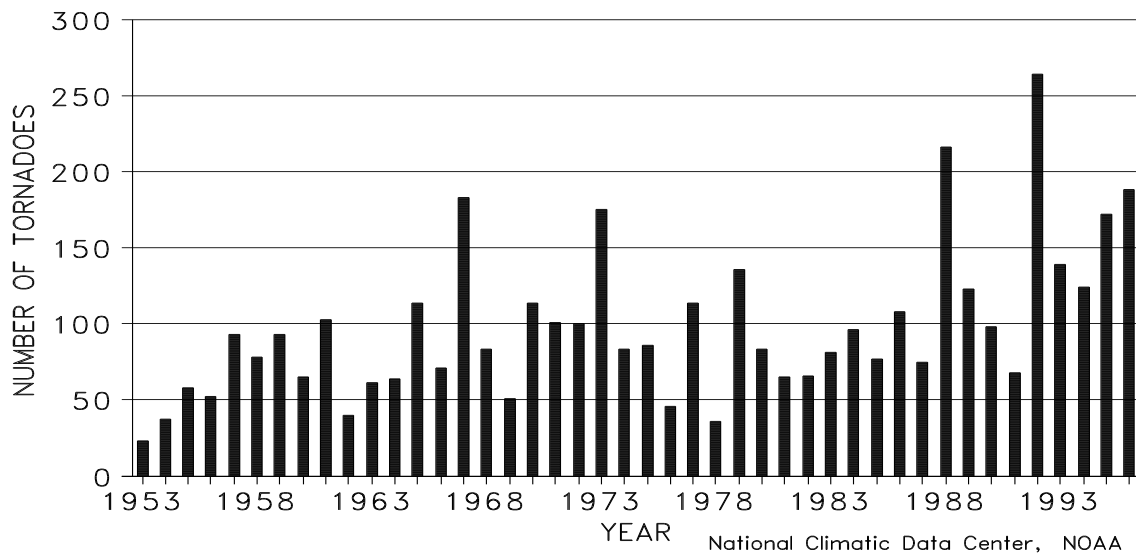
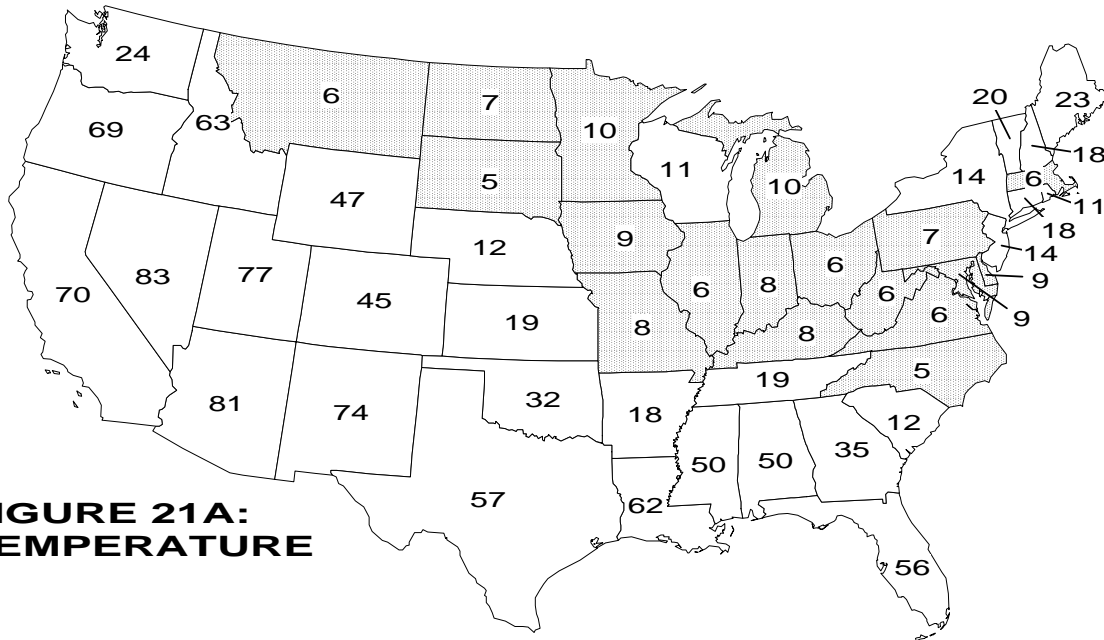
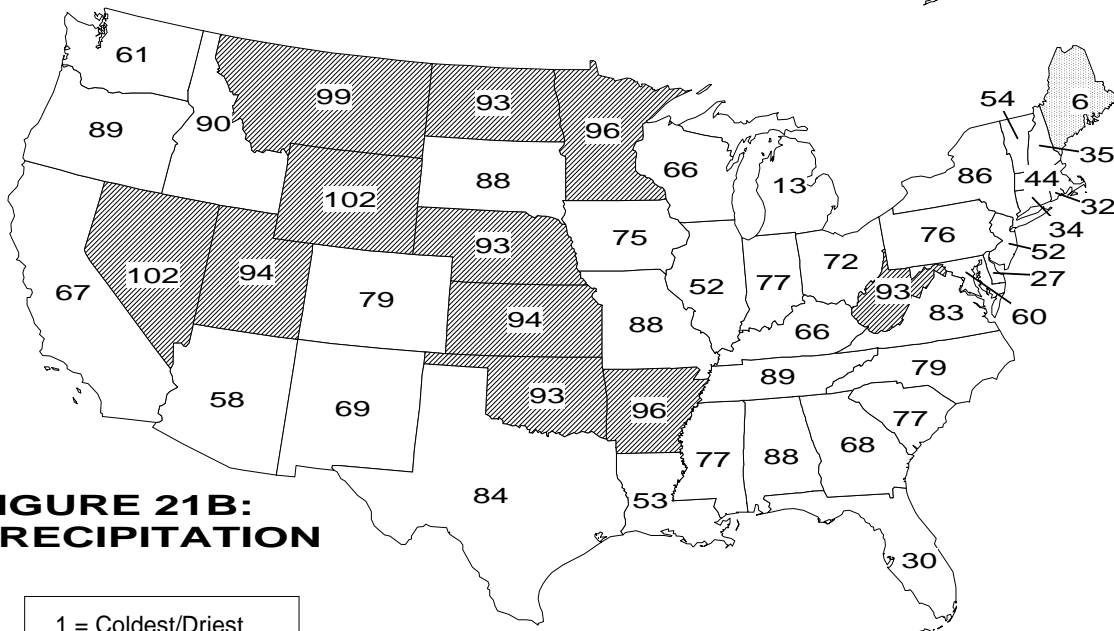


Figure 20: November statistics: 48 tornadoes in 1996 compares to 1953-95 average of 30. For Autumn, 188 tornadoes in 1996 compares to 1953-95 average of 96, max of 264 in 1992, min of 23 in 1953. The preliminary count (i.e., for 1996) is generally higher than the final count. Tornado observations have generally improved with time as better observing practices and instrumentation (especially weather radar and satellites) were utilized.

NOVEMBER 1996 STATEWIDE RANKS



**FIGURE 21A:
TEMPERATURE**



**FIGURE 21B:
PRECIPITATION**

1 = Coldest/Driest
102 = Warmest/Wettest

National Climatic Data Center, NOAA

Temperature and Precipitation Ranks for the contiguous United States. Each state is ranked based on its data from 1895-1996. States having a rank of top ten coldest or driest (rank 1-10) or top ten warmest or wettest (rank 93-102) are shaded.

JAN-NOV 1996 STATEWIDE RANKS

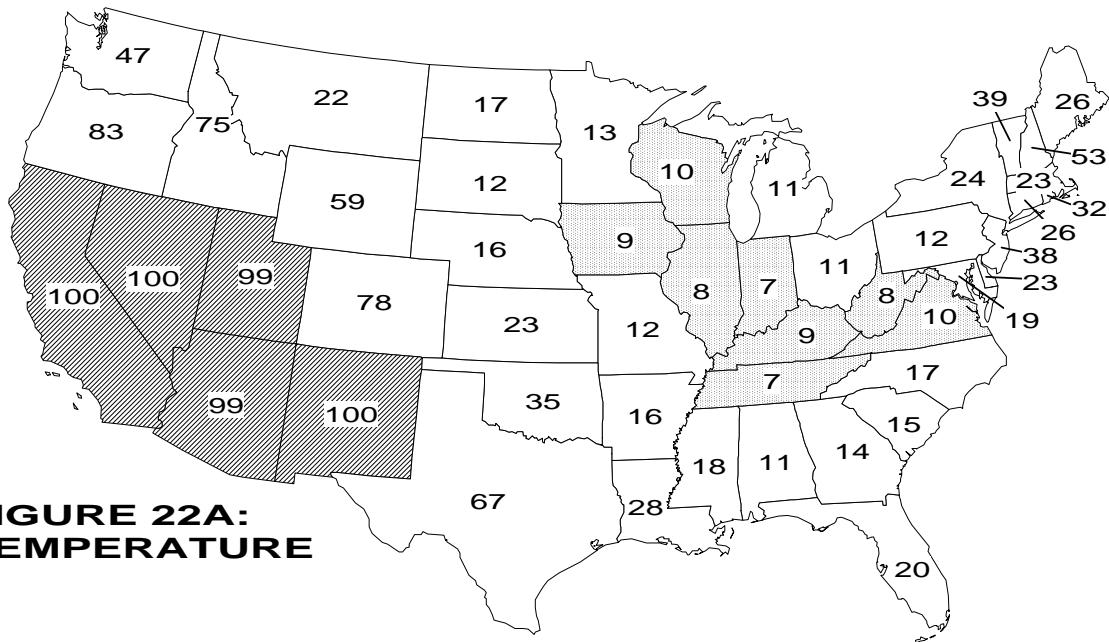


FIGURE 22A: TEMPERATURE

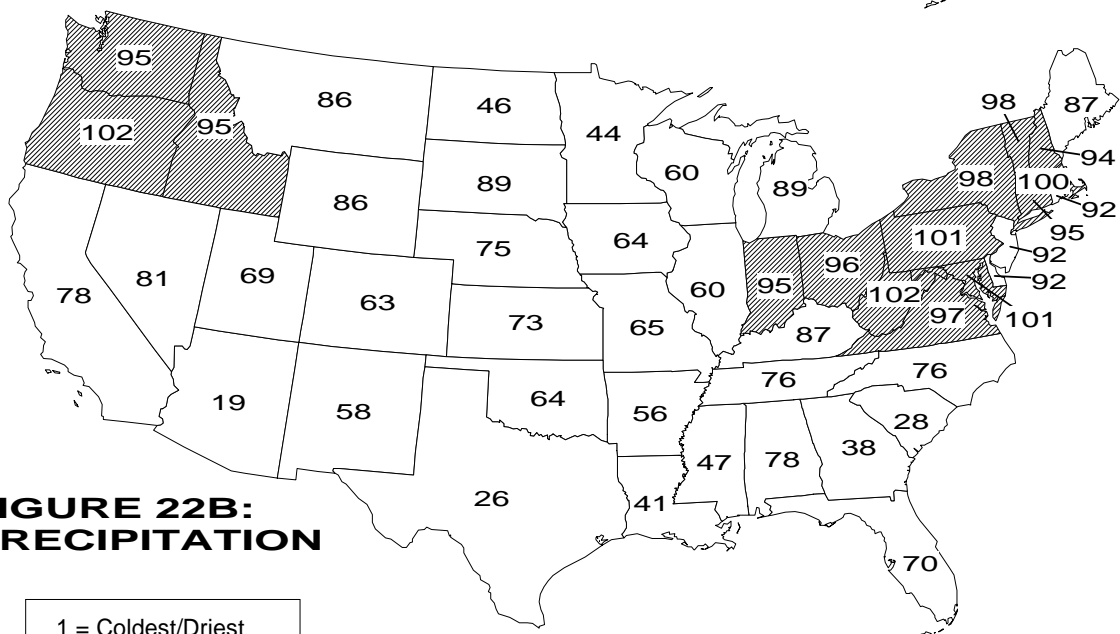


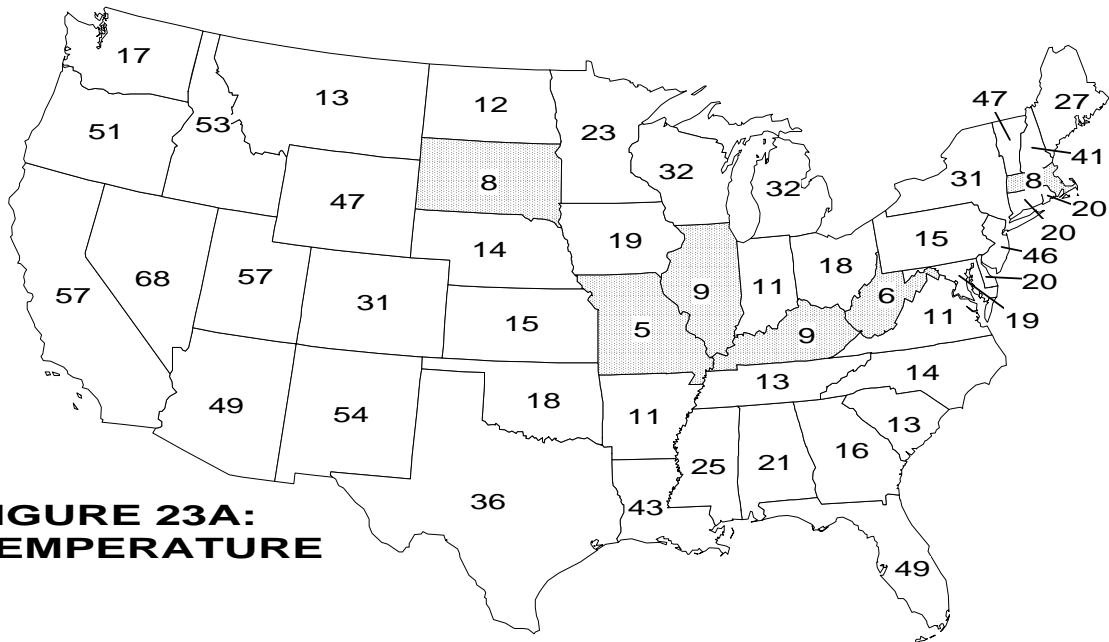
FIGURE 22B: PRECIPITATION

1 = Coldest/Driest
102 = Warmest/Wettest

National Climatic Data Center, NOAA

Temperature and Precipitation Ranks for the contiguous United States. Each state is ranked based on its data from 1895-1996. States having a rank of top ten coldest or driest (rank 1-10) or top ten warmest or wettest (rank 93-102) are shaded.

AUTUMN (SEP-NOV) 1996 STATEWIDE RANKS



**FIGURE 23A:
TEMPERATURE**

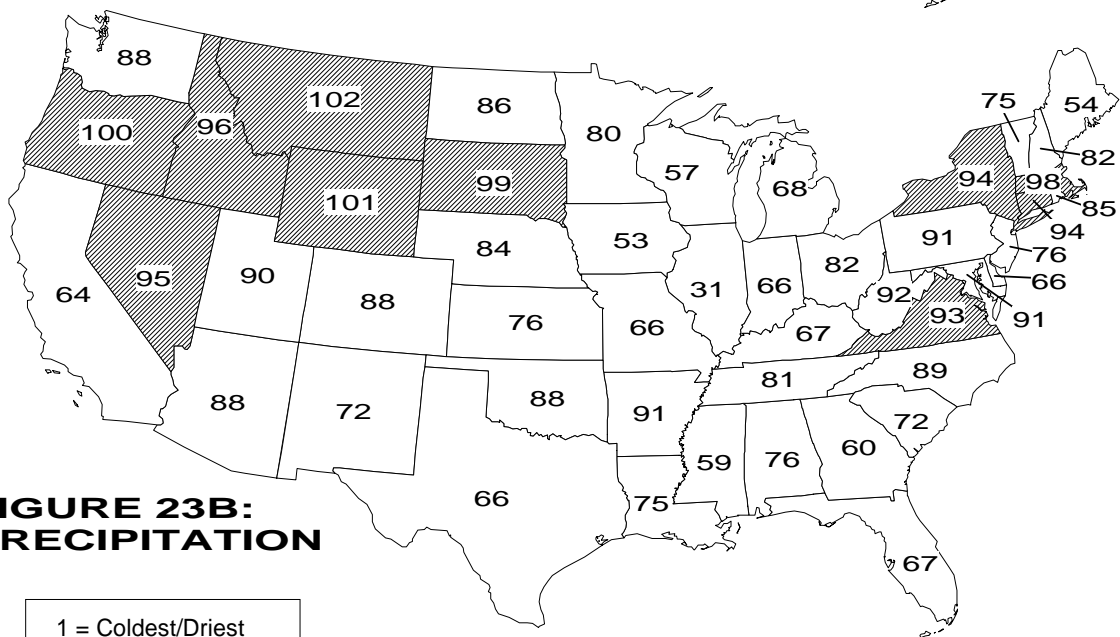


FIGURE 23B: PRECIPITATION

1 = Coldest/Driest
102 = Warmest/Wettest

National Climatic Data Center, NOAA

Temperature and Precipitation Ranks for the contiguous United States. Each state is ranked based on its data from 1895-1996. States having a rank of top ten coldest or driest (rank 1-10) or top ten warmest or wettest (rank 93-102) are shaded.

The maps show the 1996 temperature and precipitation ranks for the 48 contiguous states. The November 1996 ranks are shown in Figures 21A (temperature) and 21B (precipitation). Unusually cold temperatures dominated much of the nation east of the Rockies, with 18 states ranking in the top ten coldest category for November 1996 (see Figure 21A). No states ranked in the top ten warmest category. This pattern resulted in an unusually cold temperature rank (16th coldest since 1895) for the nation as a whole (see Table 1 and Figure 1).

Unusually wet conditions characterized November 1996, with 11 states ranking in the top ten wettest category. These states spread in a patchwork pattern from Nevada, in the west, to West Virginia, in the eastern U.S. Only one state (ME) ranked in the top ten driest category. ***It should be noted that these November state categorical precipitation ranks are preliminary and should be used with considerable caution due to the high variability of precipitation on a small space and time scale.***

The year-to-date (Figure 22A) shows a warm pattern in the west, where 5 states ranked in the top ten warmest category, and a cold pattern east of the Rockies, where 8 states (stretching from the Great Lakes to the Tennessee Valley and Mid-Atlantic coast) ranked in the top ten coldest category. This pattern reflects an upper-level (Jet Stream) circulation that has been dominated (during most months from January-November) by a warm ridge in the west and a cooler trough in the east.

For 1996 year-to-date precipitation (Figure 22B), 14 states ranked in the top ten wettest category and were clumped in the two northern corners of the country---the Pacific Northwest and from the Ohio Valley to the Northeast. This contributed to the unusually wet January-November rank for the nation as a whole (see Figures 5 and 6). No states ranked in the top ten driest category for year-to-date, although the drought earlier this year lowered the overall January-November ranks of Arizona and Texas.

The Autumn 1996 temperature (Figure 23A) and precipitation (Figure 23B) state rank patterns are consistent with the year-to-date patterns. Cold temperature ranks characterized the states east of the Rockies, with 6 states ranking in the top ten coldest category---a result of repeated outbreaks of cold polar air masses directed southeastward across the area by the trough pattern in the upper atmosphere. No states ranked in the top ten warmest category. Consequently, the nation averaged on the cold side for Autumn 1996 (see Table 3 and Figure 13). Autumn 1996 precipitation was unusually wet from the western U.S. to the Northern Great Plains, and from the Mid-Atlantic to parts of the Northeast, with 10 states in total ranking in the top ten wettest category.

It should be emphasized that all of the temperature and precipitation ranks on these maps and in the tables are based on preliminary data. The ranks will change when the final data are processed.